WHAT IS CLAIMED IS:

1. A metal complex composition comprising complexes of metal species comprising a rare earth element, barium and copper, said complexes having ligands of (a) trifluoroacetic acid or pentafluoropropionic acid, (b) pyridine and (c) acetylacetone coordinated with said metal species.

2. A metal complex composition as claimed in claim 1, wherein said metal species further comprise at least one of calcium and strontium.

3. A metal complex composition as claimed in claim 1, further comprising a neutral organic solvent in which said complexes of metal species are dissolved.

4. A metal complex composition as claimed in claim 3, wherein said metal species further comprise at least one of calcium and strontium.

5. A metal complex composition as claimed in claim 1 and in the form of an amorphous solid.

6. A metal complex composition as claimed in claim 5, wherein said metal species further comprise at least one of calcium and strontium.

7. A method of preparing a metal complex composition according to claim 1, comprising the steps of:

(a) providing a solution comprising (A) a rare earth element salt selected from the group consisting of an acetylacetonate, a trifluoroacetate and a pentafluoropropionate, (B) a barium salt selected from the group consisting of an acetylacetonate, a trifluoroacetate and a pentafluoropropionate and (C) a copper salt selected

from the group consisting of an acetylacetonate, a trifluoroacetate and a pentafluoropropionate dissolved in a mixed solvent including pyridine and at least one member selected from the group consisting of acetylacetone, trifluoroacetic acid and pentafluoropropionic acid such that said solution contains acetylacetone and at least one of trifluoroacetic acid and pentafluoropropionic acid, and

(b) removing the mixed solvent from said solution to obtain a solid phase.

8. A method as claimed in claim 7, wherein step (a) comprises dissolving a mixture containing acetylacetonates of a rare earth element, barium and copper in pyridine and in an organic acid selected from the group consisting of trifluoroacetic acid and pentafluoropropionic acid.

9. A method as claimed in claim 7, wherein step (a) comprises dissolving a mixture containing organic acid salts of a rare earth element, barium and copper in pyridine and in acetylacetone, said organic acid being selected from the group consisting of trifluoroacetic acid and pentafluoropropionic acid.

10. A method as claimed in claim 7, wherein said solution additionally contains at least one salt selected from the group consisting of calcium acetylacetonate, calcium trifluoroacetate, calcium pentafluoropropionate, strontium acetylacetonate, strontium trifluoroacetate and strontium pentafluoropropionate.

11. A method as claimed in claim 7, further comprising dissolving said solid phase in a solvent.

12. A method of preparing a metal complex composition according to claim 1, comprising providing an acidic

solution of trifluoroacetic acid or pentafluoropropionic acid salts of a rare earth element, barium and copper dissolved in an organic solvent, and mixing said solution with pyridine and acetylacetone to obtain a neutral solution.

13. A method as claimed in claim 12, wherein said acidic solution additionally contains at least one of trifluoroacetic acid or pentafluoropropionic acid salts of calcium and strontium.

14. A method as claimed in claim 12, wherein said organic solvent is selected from the group consisting of alcohols, ketones and ethers.

15. A method as claimed in claim 12, wherein said organic solvent is methanol.

16. A process for the preparation of an oxide superconductor, comprising the steps of:

(a) applying to a substrate an organic solvent solution of a metal complex composition according to claim 1 having metal constituents of the oxide superconductor in a stoichiometry nearly equal to the stoichiometry of the oxide superconductor to form a coating thereon; and

(b) heat treating said coating at a temperature and for a period of time sufficient to form a superconductive phase.

17. A process as claimed in claim 16, wherein said substrate is a member selected from the group consisting of metals, metal oxides and ceramics.

18. A process as claimed in claim 16, wherein said metal complex composition has a molar ratio of RE:Ba:Cu of 1:2:3

or 1:2:4, wherein RE represents the rare earth element.

19. A process as claimed in claim 16, wherein said metal species of said metal complex composition further comprise at least one of calcium and strontium.

20. A process as claimed in claim 16, wherein step (b) comprises heating said coating at a temperature of 200-500°C, followed by calcining at 700-1150°C in a steam-containing atmosphere.

21. A process as claimed in claim 16, wherein step (a) comprises spraying said solution over a surface of said substrate heated at a temperature of 100-1,000°C to form a layer deposited on said surface, and wherein step (b) is preceded by step (a) and comprises calcining said layer at 700-1150°C in a steam-containing atmosphere.